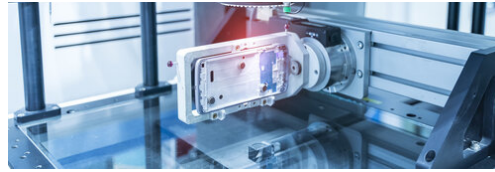


# **EXHIBIT 10**



industry, it has always been a challenge to keep products in focus under the camera or to quickly scan various objects at different distances. This can result in the need for additional mechanics or use of multiple cameras at different working distances, additional light sources and a drastic increase of costs and power consumption.



Optotune's focus tunable liquid lenses provide a versatile, compact and cost-effective solution to these challenges. Thanks to the absence of translational mechanics, Optotune lenses have the possibility to focus within few milliseconds, ensuring robustness and reliability with a lifetime of billions of cycles.

## Applications

- Quality control (e.g. liquids, electronics, bottles, LCDs, PCBs, ICs, CCMs)
- Packet sorting, box filling, palletizing
- Bar code reading
- Robot vision
- 3D image stacking

## Advantages

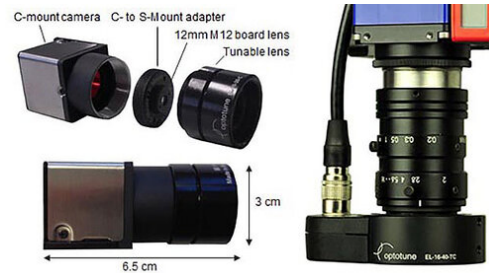
- Fast focus within milliseconds
- Large working distance range
- Quicker system installation
- Remote focus control
- Long life time (>1B cycles)



Optotune Liquid Lenses for Fast Focusing in Machine Vision. 简体中文

## Front lens configuration

Vision systems from 8 to 50mm focal length allow Optotune's liquid lenses to be mounted in front, providing the possibility a wide focus range from infinity down to 100mm.



For extremely compact systems it is possible to combine the Optotune liquid lenses with M12 board lenses directly on a C-mount camera, reaching an extreme compact and space saving design.

Try out our [Online Lens Configurator](#)

## Back lens configuration

Optotune's liquid lenses can be placed between camera and imaging lens. In case of C-mount lenses the liquid lens act as a spacer, giving the possibility to





space within the flange focal distance, allowing the possibility to focus to infinity.

Compared to the front lens configuration, the back lens configuration offers large image circles up to 30mm, better resolution and repeatability of the focus plane with a smaller working distance range.

Try out our [Online Lens Configurator](#)

## Telecentric lenses

Telecentric lenses perform best when the liquid lens is placed directly after the aperture stop. A variety of such designs are available with magnification ranges from 0.13X to 4X. The integration of Optotune's liquid lenses in this configuration typically increases the depth of field by a factor of 100, providing for example a focus range of 20mm at 1X magnification.

By benefitting from Optotune liquid lenses in this configuration no image distortion, resolution decrement, vignetting or orientation dependence are added.

If you want to have more information about our current





liquid lenses in combination with Telecentric lenses are listed [here](#).

## High magnification

To achieve magnifications of 1x up to 100x, the tunable lens is best placed between objective lens and tube lens. There are several off the shelf products available such as [Dynamic Focus VZM lens](#) by Edmund Optics, the [Optem FUSION sytem](#) by Qioptiq or Navitar's [Zoom 6000 system](#).



For applications related to the life science market, have a look at our [microscopy section](#).

## Custom designs

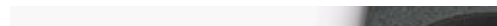
Optimal performance is achieved when Optotune's liquid lenses are designed into the imaging optics close to the aperture stop. This allows for large image circles, low f-numbers and best resolution. Optotune is collaborating with several optics companies around the globe to provide an increasing number of such optimized solutions.



For more information about our optimized solutions, have a look at our [ELM series](#).



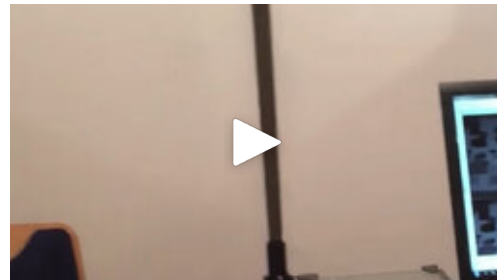
Optotune booth at Vision Stuttgart



EL-16-40 focus tunable lens with  
embedded CL-160 driver with  
Gustavo Ciardi



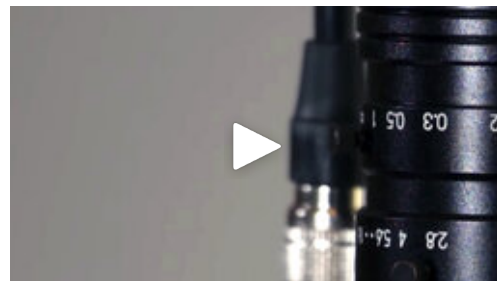
Focus tunable liquid lenses in  
Machine Vision



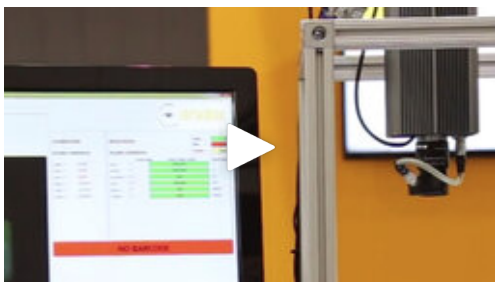
Focus stacking at 20 fps using  
Silicon Software FPGA



Presentation at Stemmer Tech  
Forum in Munich (in German)



How it works, by Stemmer  
Imaging



Fast focusing implemented by  
Infaimon using Sherlock



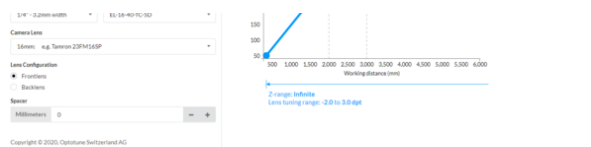
FOV expansion 的液态镜头与二  
维振镜可以大幅度扩大成像系统的  
FOV与景深

## Machine Vision lens selector and lens configurator



1"	C	74°	77°	56°	44°	29°	21°	15°	10°	7°
30mm diag.	M42	128°	114°	91°	75°	52°	39°	28°	19°	14°
Front lens configuration only						Back lens configuration only				
		Not possible	Possible with custom optics design	Custom design available	Vignetting with off-the-shelf lenses	Possible with off-the-shelf lenses				

\*\* Customized lens in development



[Offline lens selector](#)

[Online lens configurator](#)

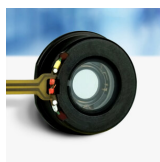
## Products: Machine Vision



**EL-16-40**  
[Product page >](#)



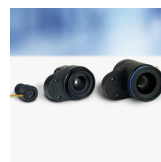
**EL-10-30-Ci**  
[Product page >](#)



**EL-3-10**  
[Product page >](#)



**Telecentric series**  
[Product page >](#)



**ELM series**  
[Product page >](#)

## Downloads

[Introductory presentation for machine vision](#)

[Detailed presentation for machine vision](#)

[Brochure for machine vision](#)

[Product portfolio for robots and drones](#)

[Whitepaper on distance measurement \(depth from focus\)](#)

## Test reports entocentric lenses



## VS-THV110 incl. EL-16-40

25mm: Optotune ELM-25-2.8-18-C by Evetar incl. EL-16-40

35mm: Optotune ELM-35-5.6-16-C by Kowa incl. EL-16-40

50mm: Optotune ELM-50-2.8-18-C by c4c incl. EL-16-40

60mm: Schneider Apo Componon 60F4 + Optotune EL-16-40-TC-VIS-5D-M42

75mm: Apo-Rodagon D1x 75mm + Optotune EL-16-40-TC-VIS-5D-M42

300mm: Sill Optics S5VPJ0303 with EL-16-40-M42 integrated

0.36x: Linkhou TCPLP23-0.36-115 incl. Optotune EL-16-40

0.5x: Opto Engineering TCEL050 incl. Optotune EL-16-40

1x: VS-THV1-110-LQL1 incl. Optotune EL-16-40-TC

1x: Moritex MML1-ST150D telecentric lens + Optotune EL-16-40-TC

2x: Moritex MML2-HR110 telecentric lens + Optotune EL-16-40-TC

2x: Sill Correctal T\_2.0 telecentric lens incl. Optotune EL-16-40-TC

2.5-7.5x: Edmund Optics 2x 0.13 NA Objective + Optotune EL-16-40-20D-C

## News



Optotune presents 'Gigapixel Camera - Field of View Expansion' featuring the Optotune EL-16-40 and MR-15-30. [Watch the video on YouTube >](#)

Recently David Leuenberger and Andreas Amrein of Optotune gave a TechTalk on 2D Mirrors &

## Events



Visit Optotune at the [EXPO21XX online exhibition >](#)

## Contact



Optotune Switzerland AG  
Bernstrasse 388  
CH-8953 Dietikon  
Switzerland

Tel: [+41 58 856 3000](tel:+41588563000)  
Fax: [+41 58 856 3001](tel:+41588563001)

Email: [sales@optotune.com](mailto:sales@optotune.com)  
Sales & support: [Contact us](#)

## Sales



Optotune's standard products are available from our global partner [Edmund Optics](#) and local sales partners around the world. [Contact us](#) to get in touch with the right people.





Beam closing page

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